

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

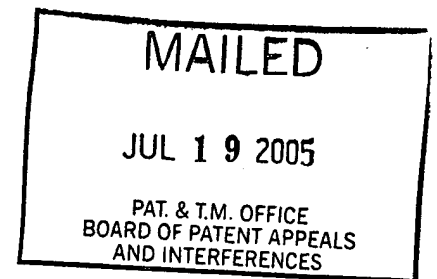
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte NOBUAKI HASHIMOTO

Appeal No. 2005-1560
Application No. 09/615,503

ON BRIEF



Before HAIRSTON, KRASS, and RUGGIERO, Administrative Patent Judges.
KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1-9 and 12-20.

The invention pertains to attaching a plurality of semiconductor chips to a tape on a reel-to-reel transport system. Conventionally, external terminals were provided on a package of chips and the tape was cut to provide individual semiconductor chips, but difficulties arise in providing external terminals in a reel-to-reel transport system prior to cutting the tape, and if a faulty sample occurs, there are large losses. The instant

invention uses a reel-to-reel transport system, with a plurality of semiconductor chips attached to a tape, but the reel-to-reel transport system is used to partially assemble a semiconductor device and then provide external terminals after the device is removed from the reel-to-reel transport system.

Independent claim 1 is reproduced as follows:

1. A method of fabricating a semiconductor device comprising:
 - (a) attaching a plurality of semiconductor chips to a tape;
 - (b) cutting the tape to obtain substrates after the step (a); and
 - (c) providing a plurality of external terminals on each of the substrates after the step (b),wherein the steps (a) and (b) are carried out in a reel-to-reel transport system.

The examiner relies on the following references:

Marrs et al. (Marrs)	5,583,378	Dec. 10, 1996
Shim et al. (Shim)	5,905,633	May 18, 1999

Claims 1-9 and 12-20 stand rejected under 35 U.S.C. §103. As evidence of obviousness, the examiner cites Shim with regard to claims 1-4, 9, and 12-20, adding

Marrs with regard to claims 1-9, and 12-20. Thus, all of the claims stand rejected as obvious over the combination of Shim and Marrs, while claims 1-4, 9, and 12-20 are also deemed obvious over Shim, alone.

Reference is made to the briefs and answer for the respective positions of appellant and the examiner.

OPINION

We will focus on independent claim 1 since all other claims stand or fall with claim 1, in accordance with appellant's grouping of the claims at page 4 of the principal brief.

The examiner specifically relies on column 1, line 18, through column 2, line 1, and column 3, line 51, through column 5, line 46, of Shim. In particular, with regard to the specifics of claim 1, the examiner indicates that the plurality of semiconductor chips 20 are attached to tape 60, and the tape 60 is cut to obtain substrates (column 2, lines 33-36). Moreover, the examiner asserts that these steps are carried out in a reel-to-reel transport system. The examiner indicates that solder balls 50 of Shim constitute the claimed plurality of external terminals.

Appellant argues that Shim specifically teaches attaching the external terminals before cutting the substrate, pointing to column 2, lines 12-35. Therefore, according to appellant, Shim does not disclose the claimed step of providing a plurality of external terminals on each of the substrates after cutting the tape.

From Shim's description of his invention, especially, at column 2, lines 30-36, it is clear that the solder balls (external terminals) are welded into place and then the metal carrier frame is cut. Thus, Shim does not appear to attach the external terminals *after* cutting the substrate, as required by instant claim 1. The question, however, is whether it would have been obvious to do so, within the meaning of 35 U.S.C. §103.

The examiner does not dispute that Shim discloses a method with a different sequence of steps, but alleges that

it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed sequence because applicant has not disclosed that, in view of the applied prior art, the limitation is for a particular unobvious purpose, produces an unexpected result, or is otherwise

critical. Moreover, it is well established that, in a well known process, the order of performing process steps is *prima facie* obvious in the absence of new and unexpected results. See MPEP 2144.04, and *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)... (answer-page 8).

Use of an element is an obvious design choice where such use presents no novel or unexpected result and solves no stated problem and would be an obvious matter of design choice within the skill of the art. *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975). However, in the instant case, the attachment of external terminals *after* cutting the substrate is disclosed as being an improvement in the art because “productivity can be improved” (specification-page 2) and “manufacturing cost can be reduced” (specification-page 3). Also, it is disclosed that “[i]f a faulty sample occurs in the step of providing the external terminals, the disposal losses are less than in a reel-to-reel transport system” (specification-page 3). Thus, there are unexpected results and the instant invention does solve a stated problem. Therefore, the examiner cannot merely allege an “obvious matter of design choice” in attaching external terminals after cutting the substrate, rather than attaching the external terminals and then cutting the substrate. The examiner must present some evidence, some convincing rationale, as to why the skilled artisan would have found it equally obvious to attach external terminals before or after cutting the substrate. The mere allegation of “obvious matter

of design choice," without more, is insufficient to find obviousness of the instant claimed subject matter.

Accordingly, we will not sustain the rejection of claim 1 under 35 U.S.C. §103 over Shim.

We will, however, sustain the rejection of claim 1 under 35 U.S.C. §103 over Shim in view of Marrs. Marrs is relied on by the examiner for disclosing the provision of a plurality of external terminals 218J on each of substrates 280G after the steps of attaching a plurality of semiconductor chips 202H to a tape 299E and cutting the tape to obtain the substrate (see page 6 of the answer).

The examiner contends that it would have been obvious to combine Marrs with Shim because Marrs discloses, at column 10, lines 29-32, that it would facilitate cost effective and efficient mass production.

It does appear that Marrs discloses attachment of external terminals after a substrate is cut, as column 10, lines 15-32, discloses the formation of "strips," i.e., these strips are punched or routed out of panel 299E, and, afterward, they are "wire bonded

for electrical connection" (column 10, lines 22-23) and solder balls are applied (column 10, lines 26-27).

While appellants argue that Marrs discloses a method to assemble individual ball grid array packages and that Marrs does not recognize the problems that are solved by the instant invention, we disagree.

Marrs discloses, at column 9, lines 39-41, that while the patent discloses a certain method of manufacturing ball grid arrays, it is recognized "that other methods for manufacturing ball grid packages such as a reel to reel printed circuit board manufacturing could be employed." Thus, it would appear that where such a reel to reel manufacturing method is employed, taken together with Marrs' disclosure, at column 10, lines 15-32, Marrs is suggesting that the external terminals are attached *after* the substrates are cut.

Appellant argues that this interpretation is improper because the disclosure of Marrs of using his system in a reel to reel transport system "must be placed in the proper context" (reply brief-page 4). To this end, appellant notes that Marrs is directed to the assembly of individual ball grid array packages and that the disclosed methods start with 9" x 12" panels that are not used in conjunction with a reel to reel transport

system. Appellant further explains that using these methods, solder balls are applied once strips of package units have been formed from the panels and that Marrs does not disclose that solder balls or external terminals are provided after the panel has been cut into strips on a reel to reel transport system. Appellant indicates that Marrs states that ball grid array packages, all final products with external terminals formed thereon, can be produced in a reel to reel manufacturing method, implying that the external terminals are also formed while still on the reel to reel transport (reply brief-pages 4-5).

We have reviewed the disclosure of Marrs and do not find the implication alleged by appellant. In column 9, Marrs describes the steps of manufacturing a ball grid array package, and then explicitly states that "other" methods, such as "a reel to reel" manufacturing method may be used (column 9, lines 39-41). Thus, it is clearly taught by Marrs that a reel to reel transport system may be used to manufacture ball grid arrays. Then, in the next column, column 10, Marrs describes a stage of production wherein panels comprise empty ball grid array package units and the panels are formed into strips of package units. The strips are punched or routed out of the panel (column 10, lines 15-17). Therefore, the strips, comprising the package units, are cut from the substrate. Once these strips are created, integrated circuit chips "are wire bonded for electrical connection" (column 10, lines 22-23). Further, if solder balls are required, they are applied "at this stage" (column 10, lines 26-27).

While Marrs goes on to state that individual units 270G "are then marked and punched out, thereby producing individual ball grid array packages 200 including integrated circuit chips 202...in a cost effective and efficient manner, " and this step is performed after the application of the external terminals, i.e., solder balls, it appears to us that the broad language of the instant claim does not preclude that which is described up to column 10, line 28, of Marrs, whereby the punch out of the strips is akin to the claimed "cutting the tape to obtain substrates" and the application of the solder balls (column 10, lines 26-27) is the claimed step of providing a plurality of external terminals.

Thus, it would appear that Marrs, alone, teaches the invention broadly set forth in instant claim 1, with Shim's teaching being merely cumulative. Accordingly, we will sustain the rejection of claims 1-9 and 12-20 under 35 U.S.C. §103 over the combination of Shim and Marrs.

Accordingly, the examiner's decision is affirmed.

AFFIRMED

BOARD OF PATENT
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